CHAPTER 3:
AFFECTED ENVIRONMENT

[This page is left intentionally blank]

Chapter Three: AFFECTED ENVIRONMENT

The purpose of this chapter is to succinctly describe existing environmental conditions of the potentially affected geographic area for the Proposed Action. Section 3.1 provides the characteristics of the surrounding area to familiarize the reader with the airport facilities and existing airspace, geography, land use and general environmental conditions. Section 3.2 briefly discusses those resource categories not anticipated to be impacted. Section 3.3 provides the baseline conditions for the natural and social environment to be evaluated for potential impacts due to the Proposed Action Alternative.

3.1 Study Area Setting and General Conditions

3.1.1 Setting and Location

The Study Area, as described in Chapter 1, encompasses approximately 1,500 square miles and includes all or part of six counties in the Commonwealth of Massachusetts, including Bristol, Essex, Middlesex, Norfolk, Plymouth, and Suffolk. There are 12 airports and 64 heliports within the Study Area, as illustrated in **Figure 3-1**.

3.1.2 Logan Airport

This EA focuses on Logan Airport, which is located in the East Boston neighborhood of Boston, in Suffolk County, Massachusetts, one mile east of downtown Boston. Massport owns and operates Logan Airport under the management of the Department of Aviation. In 2012, approximately 359,633 annual aircraft operations were conducted at Logan Airport.[1] Thirty-two major scheduled airlines, including legacy carriers and regional affiliates, operate out of the Airport.[2] Six runways are located on the airfield. Runway 14/32 is oriented to the northwest/southeast and is 5,000' in length. Runway 15R/33L is 10,083' in length, and Runway 15L/33R is 2,557' long. Oriented to the northeast/southwest, Runway 4L/22R is 7,861' long and Runway 4R/22L is 10,005' long. Runway 9/27 is 7,000' in length and is oriented in an east/west configuration. Figure 1-1 depicts the runways in operation at Logan Airport.

3.1.3 Land Use

This section describes the existing land use within the Study Area. Information on existing land use was obtained from MassGIS.

Like most urban metropolitan areas, the Study Area is characterized by dense development near larger cities (including Boston), and lower density uses further from the urban core. As shown by the generalized land use depicted in **Figure 3-2**, the predominant land uses within the Study Area are residential and open space, with pockets of commercial and industrial uses.

Figure 3-3 depicts land use in the vicinity of Logan Airport. Predominant land uses in the vicinity of the Airport include open water, residential, commercial, and industrial. The

Boston Logan International Airport

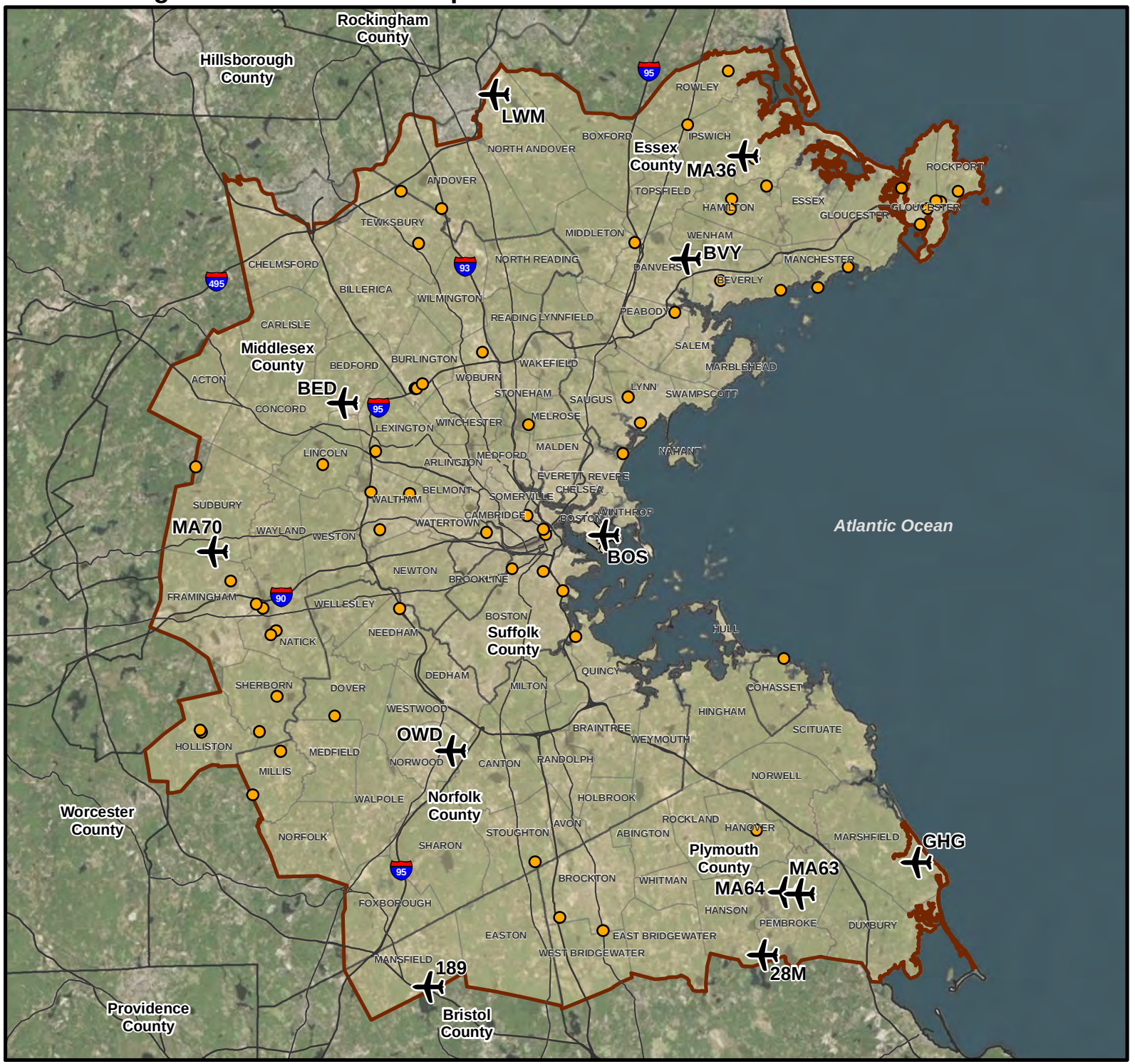

Figure 3-1
Airports in the Study Area

LEGEND

- Airport
- Heliport
- Study Area
- Community within Study Area
- County Boundary
- Interstate / Highway

Boston Logan International Airport Runway 33L RNAV SID Final EA

N

0 1 2 4 Nautical Miles

Source: Office of Geographic Information (MassGIS), ESRI

Boston Logan International Airport

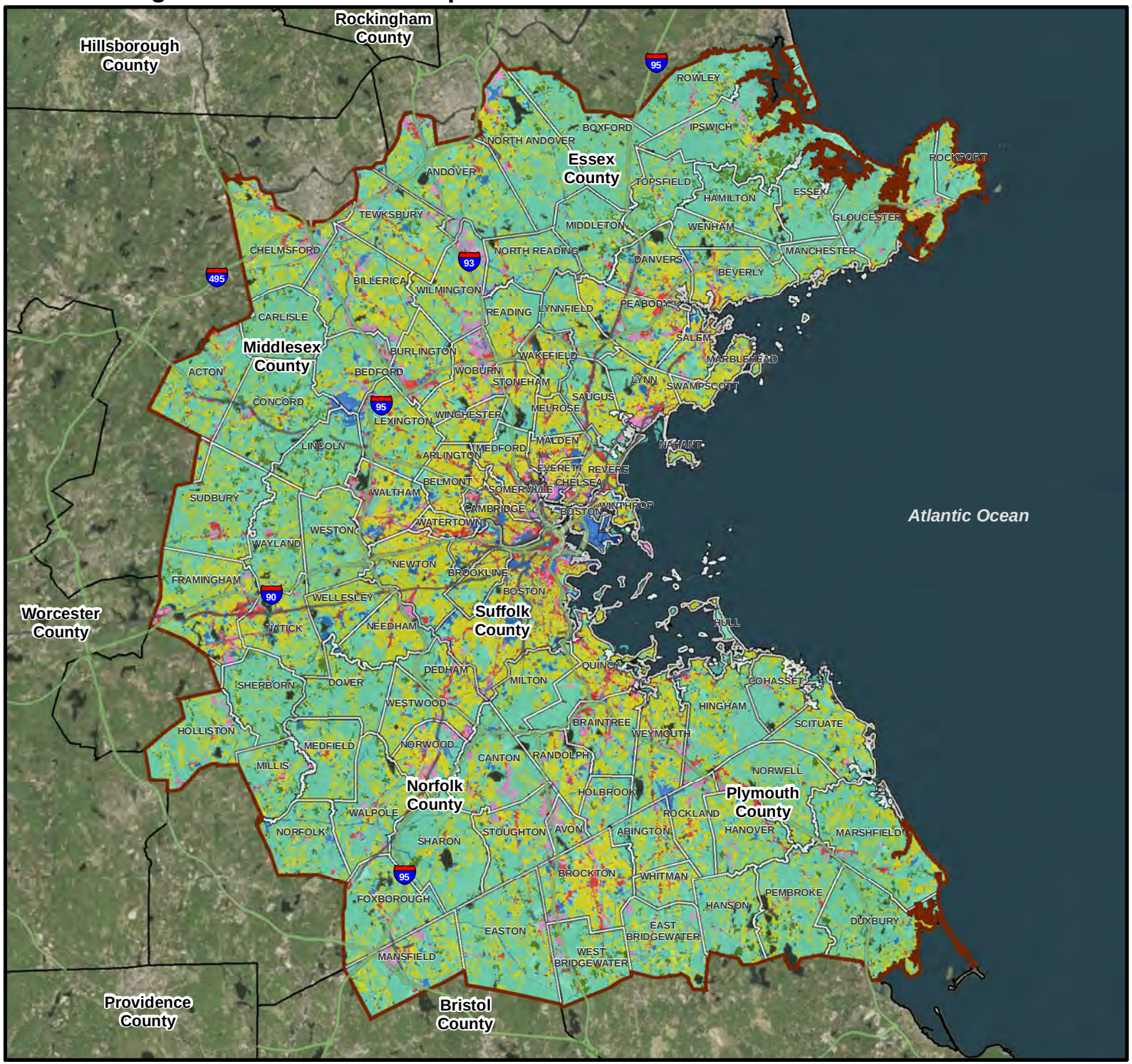

Figure 3-2 Generalized Existing Land Use within Study Area

LEGEND

- Residential
- Agricultural
- Exempt/Parks/Open Space (Undeveloped)
- Commercial
- Industrial
- Public/Institutional
- General Mixed Use
- Town Boundary
- Study Area

Boston Logan International Airport Runway 33L RNAV SID Final EA

N

0 1.25 2.5 5 Nautical Miles

Source: 2008 Aerial Photograhy, Office of Geographic Information (MassGIS), ESRI

Boston Logan International Airport

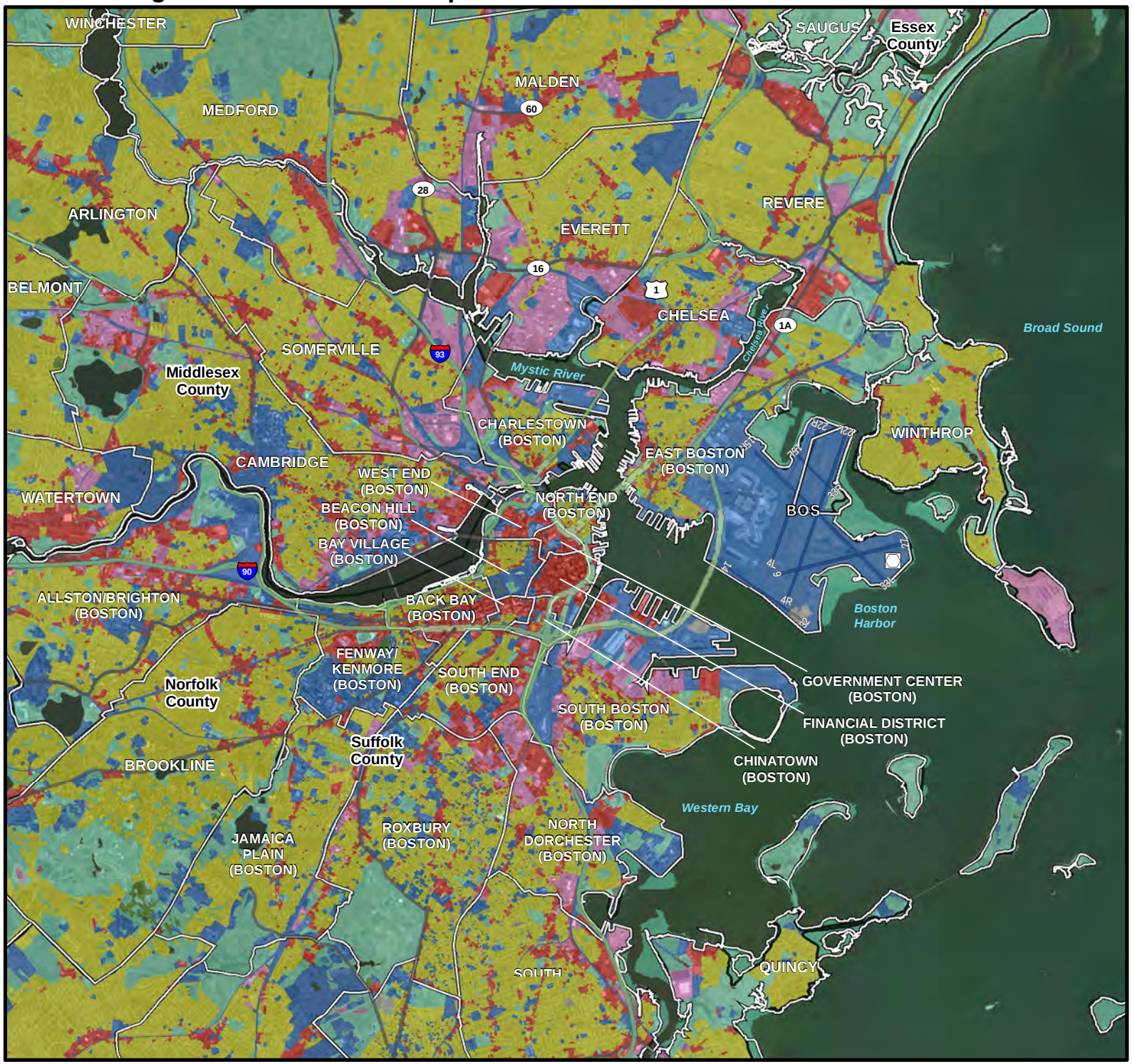

Figure 3-3 Generalized Existing Land Use - Logan Airport Vicinity

LEGEND

- Residential
- Agricultural
- Exempt/Parks/Open Space
- Commercial
- Industrial
- Public/Institutional
- General Mixed Use
- Town Boundary
- BOS VOR/DME
- County Boundary
- Major Highway
- Major Road

Boston Logan International Airport Runway 33L RNAV SID Final EA

N

0 0.2 0.4 0.8 Nautical Miles

Source: 2008 Aerial Photograhy, Office of Geographic Information (MassGIS), ESRI

Airport lies on a peninsula, which is surrounded by several bodies of water—the Mystic River, Boston Harbor, Western Bay and Broad Sound. The City of Winthrop lies to the east of Logan Airport and is comprised of primarily residential development, with some parks and open space. The City of Boston borders the Airport to the north, west and south, with the closest portions of the City having a mix of residential, commercial and industrial development. Across the Mystic River from the Airport to the west is downtown Boston, which contains high density commercial development.

3.2 Non-Issue Impact Categories

Categories not anticipated to be impacted by the Proposed Action are not required to be discussed. Neither the No Action nor the Proposed Action Alternatives would affect the following impact categories in FAA Order 1050.1E: coastal resources, construction impacts, farmland, floodplains, hazardous materials, pollution prevention and solid waste, water quality, wetlands, and wild and scenic rivers. As a result, no further analysis is required.

3.3 Potentially Affected Environmental Resource Categories

Only the FAA Order 1050.1E environmental resources that are potentially affected by the Proposed Action are discussed in this section. These include the following:

- Noise and Land Use;
- Department of Transportation Section 4(f) and 6(f) Resources;
- Historic, Architectural, Archaeological, and Cultural Resources;
- Air Quality;
- Climate; and
- Federally Threatened and Endangered Species and Migratory Birds.

Additionally, natural resources and energy supply, socio-economic impacts, environmental justice and children's health and safety risk, and light emissions and visual impacts will be briefly described in Chapter Four, *Environmental Consequences*. These impact categories have minimal potential for impact but cannot be completely dismissed.

3.3.1 Noise

Aircraft noise is often the most noticeable environmental effect associated with the implementation of new or revised air traffic control procedures. This section includes a brief overview of the noise analysis methodology used for this EA as well as a discussion of the existing aircraft noise exposure levels in the Study Area.

3.3.1.1 Noise Modeling Methodology

The FAA has developed specific guidance and requirements for the assessment of aircraft noise in order to comply with NEPA. This guidance, specified in FAA Order 1050.1E, requires that aircraft noise be analyzed in terms of the DNL metric. To this end, DNL noise levels are calculated for the average annual daily operations for the year of interest. The noise analysis is conducted for the entire Study Area up to an altitude of 14,000' MSL. Noise modeling was

conducted for 2009 (base year); forecast conditions for the No Action and Proposed Action Alternatives in 2015 are described in Chapter 4, *Environmental Consequences*. Noise modeling incorporates the analysis performed under the BLANS, and use of the BLANS methodology and input data was reviewed and approved by the FAA Office of Energy and Environment (AEE). This method provides consistency between both studies, which is believed to be critical during the public coordination process, and facilitates a noise analysis that requires only minor adjustments to the baseline model (use of the U.S. Census 2010 population data).

Noise Metric

The DNL metric is the sound level from aircraft operations for a 24-hour period, which includes all of the time-varying aircraft sound energy within the period. Since there is a greater annoyance caused by noise events at night, a 10 decibel (dB) weighting is added to DNL for night-time noise events (those that occur between 10:00 p.m. and 6:59 a.m.). The weighting, in essence, equates one night-time flight to 10 daytime flights, and helps to account for the annoyance of noise during time periods when people are trying to sleep and ambient noise levels are lower. FAA guidelines provide land uses that are considered compatible or incompatible with various DNL sound levels.[3] Guidelines for aircraft noise and land use compatibility established under 14 CFR Part 150, for purposes of Part 150, indicates that all land uses are considered to be compatible with noise levels less than 65 DNL; however, land use compatibility is a local determination.

DNL is the best measure of significant impact on the quality of the human environment, is the only noise metric with a substantial body of scientific data on the reaction of people to noise, and has been systematically related to Federal compatible land use guidelines. Federal interagency committees such as the Federal Interagency Committee on Urban Noise (FICUN) and the Federal Interagency Committee on Noise (FICON) which include the EPA, FAA, Department of Defense, Department of Housing and Urban Development (HUD), and Veterans Administration, found DNL to be the best metric for land use planning.

Noise Model

The Integrated Noise Model (INM) is the FAA's approved model for assessing noise at civilian airports. The INM has been used for environmental review of aviation noise impacts since 1978 and is used for 14 CFR Part 150 studies and NEPA EA's and EIS's. Coordination with the FAA AEE was undertaken regarding the required noise model used in this EA. The INM is an average-value model which is designed to estimate the long term average changes in operating conditions.

Detailed information on aircraft operations at Logan Airport is included in the INM, including specific fleet mix information (aircraft type, arrival and departure times, trip distance), runway use, flight track location/usage, and weather conditions (e.g., temperature and humidity). Noise exposure from aircraft operations was calculated at more than 84,000 locations throughout the Study Area. The locations consist of population centroids (i.e., the center of a 2010 Census block) and noise

sensitive locations such as historic sites, schools and parks.

Census blocks are the smallest geographic unit for which the U.S. Census Bureau tabulates data. Census blocks are generally bounded by streets, legal boundaries and other features. The number of people exposed to noise is estimated as the number residing in the census block. For this analysis, the Census block counts represent the maximum potential population within the Census block that could be exposed to the modeled DNL levels, including family and non-family households, but excluding those residing in group quarters (often representing transient or temporary residential arrangements).[5] The actual number of people impacted can be less than the total population represented by a single Census block because noise levels will vary throughout the census block. A total of 59,873 census blocks (754 Census tracts) in the Study Area were analyzed.

3.3.1.2 Operational Input

This EA takes advantage of the extensive analysis previously and currently being undertaken in the BLANS process, including the use of INM input data developed under previous and ongoing studies at Logan Airport and the use of INM version 7.0a.

Operational inputs to the noise model include the number of operations on an average annual day, the type and frequency of aircraft operations, runway locations and use, flight track locations and use, and the time of day of operations (daytime or nighttime). Appendix A*, Noise Modeling Technical Report* provides additional details regarding noise model input data. The existing condition noise analysis reflects operations and operating conditions in 2009, and is intended to provide a frame of reference when considering the future condition noise analyses presented in Chapter Four, *Environmental Consequences*.

Operational data, including the number of arrivals and departures and the aircraft fleet mix, reflects data provided via Massport's AirScene Noise and Operations Monitoring System (NOMS) radar data and Massport's Draft 2009 Environmental Data Report (EDR). In 2009, 345,228 annual operations (approximately 946 average annual day operations) occurred. Logan Airport operates with multiple runway operating configurations, whose use vary based on the predominate wind and weather patterns. The configurations that use Runways 4L/R for arrivals and departures tend to be the most heavily utilized. Runway 33L accounted for approximately 17% of all aircraft departures.

The 2009 existing conditions include all of the BONS alternatives implemented prior to 2010, including RNAV SIDs from other Logan Airport runways. The 2009 noise analysis is the foundation upon which the noise modeling for the future conditions is developed.

3.3.1.3 Existing Aircraft Noise Exposure at Population Centroids

Figures 3-4 and **3-5** show the existing (2009) noise exposure levels at population centroids between 45 and 75 DNL. As would be expected, the areas closer to Logan Airport are exposed to the highest noise exposure levels. As shown in **Table 3.1**, the majority (69%) of people residing within the Study Area are exposed to aircraft noise levels less than 45 DNL.

Boston Logan International Airport

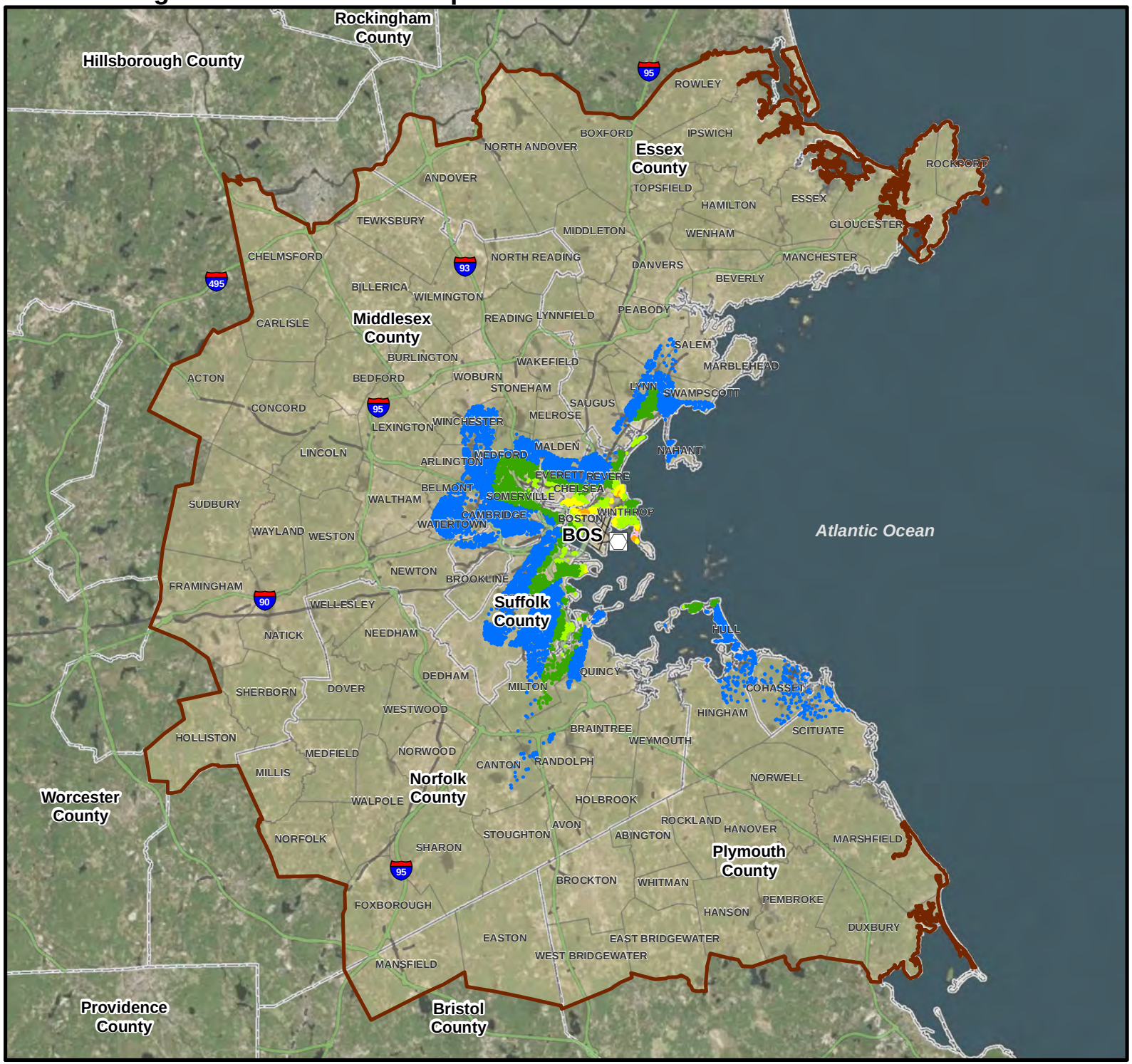

Figure 3-4
Existing (2009) Noise Exposure at Population Centroids - Study Area

LEGEND

- BOS VOR/DME
- Study Area
- Community within Study Area
- County Boundary
- Major Highway
- Major Road

Noise Exposure

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL

Note:
Noise exposure is shown for populated census block centroids only.

Boston Logan International Airport Runway 33L RNAV SID Final EA

N

0 1.25 2.5 5 Nautical Miles

Source: Office of Geographic Information (MassGIS), ESRI, 2010 U.S. Census Bureau

Boston Logan International Airport

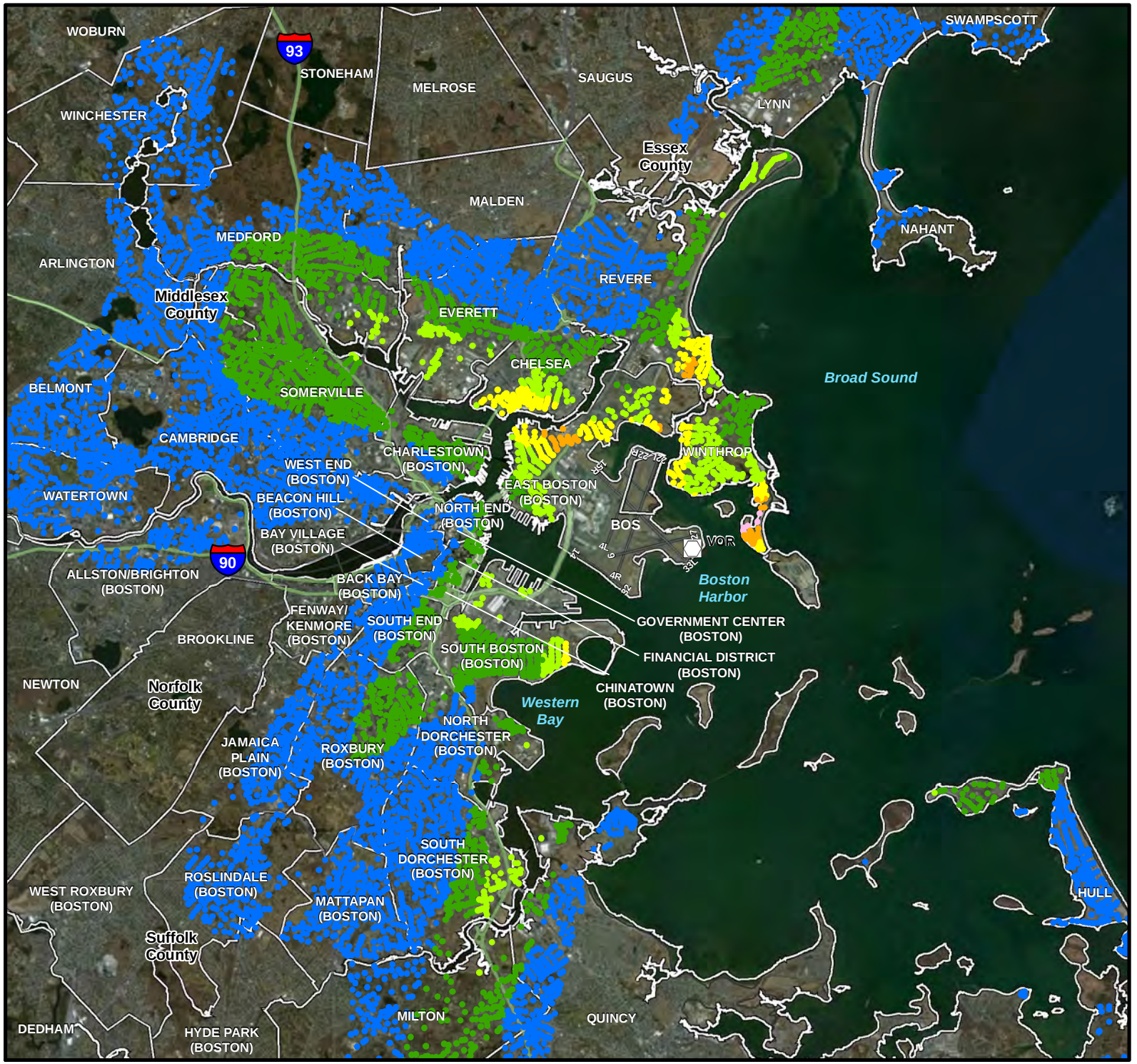

Figure 3-5
Existing (2009) Noise Exposure at Population Centroids - Logan Airport Vicinity

LEGEND

- BOS VOR/DME
- Community within Study Area
- County Boundary
- Town Boundary
- Interstate
- Highway

Noise Exposure

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL

Note:
Noise exposure is shown for populated census block centroids only.

Boston Logan International Airport Runway 33L RNAV SID Final EA

N

0 0.3 0.6 1.2 Nautical Miles

Source: Office of Geographic Information (MassGIS), ESRI, 2010 U.S. Census Bureau

Noise levels between 45 and 60 DNL include nearly 30% of the Study Area population. 27,830 persons would experience aircraft noise levels between 60 and 65 DNL, and 4,673 people would experience aircraft noise levels of 65 DNL or higher.

Table 3.1

Study Area Population Exposed to Aircraft Noise – Existing (2009) Condition

DNL Range (dB)	Population	Percentage of Total
Less than 45	2,204,095	69.1%
45 to less than 50	656,560	20.6%
50 to less than 55	238,619	7.5%
55 to less than 60	57,115	1.8%
60 to less than 65	27,830	0.9%
65 to less than 70	4,466	0.1%
70 to less than 75	207	0.01%
Greater than or equal to 75	0	0%
Total	**3,188,892**	**100%**

Note: Totals may not equal 100% due to rounding.

Source: HNTB analysis, 2012, U.S. Census 2010.

3.3.2 Section 4(f) and 6(f) of the DOT Act

49 U.S.C. Section 303(c), commonly referred to as Section 4(f) of the Department of Transportation (DOT) Act, states that the "…Secretary of Transportation will not approve a project that requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land from a historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land…and [unless] the project includes all possible planning to minimize harm resulting from the use."

The term "use" encompasses both direct and indirect impacts to Section 4(f) properties. Direct use is the physical taking of the 4(f) property. Indirect adverse impacts such as noise that compromise the use of Section 4(f) properties for their intended purpose are considered a "constructive use." The determination of use must consider the entire property and not simply the portion of the property being used for the proposed project. Privately owned parks, recreation areas and wildlife refuges are not subject to Section 4(f).

FAA has established guidelines for aircraft noise and land use compatibility under 14 CFR Part 150. Part 150 is limited, however, in its ability to assess the impact of noise in areas where quiet and serenity are expected. Special consideration is given to parks and natural areas where a quiet setting is a generally recognized purpose and attribute. In these areas the FAA official "must consult all appropriate Federal, State, and local officials having jurisdiction over the affected Section 4(f) resources when

determining whether project-related noise impacts would substantially impair the resource."[6]

Natural areas, as defined for the purpose of this document, include national parks, wildlife refuges, forests, wildlife management areas and other places that are considered recreationally and environmentally significant. The Study Area encompasses city, county, state and federally maintained parks as well as other natural areas (National Parks and National Wildlife Refuges), as identified in **Figure 3-6.**

Many Section 4(f) properties are also subject to Section 6(f) of the Land and Water Conservation Fund (LWCF) Act.[7] In Massachusetts, LWCF state matching grants are administered by the Division of Conservation Services (DCS). Since 1965, nearly 4,000 acres have been acquired using grants totaling more than $95.6 million.[8]

3.3.2.1 State Parks, Forests and Other Areas of Significance

The Commonwealth of Massachusetts manages a number of parks, forests, reservations and other parklands under the jurisdiction of the Department of Conservation and Resources, the Department of Fish and Wildlife and others. There are a number of State Parks and other Section 4(f) resources within the Study Area. Figure 3-6 also illustrates the location of State parks, forests and other areas (e.g. reservations and Wildlife Management Areas) of state significance which are contained in the project record.

3.3.3 Historical, Architectural, Archaeological, and Cultural Resources

A number of federal laws and regulations address protection of the Country's cultural resources. The statute specifically devoted to cultural resource issues is the National Historic Preservation Act of 1966 (16 USC 470), as amended, which contains two provisions that are pertinent to changes in aircraft routing.

Section 106 of the Act requires federal agencies to consider the effect of federally funded or licensed projects on properties and districts listed, or eligible for listing, in the National Register of Historic Places (NRHP).[9] National Historic Landmarks, a designation bestowed on a limited number of particularly significant cultural resources, are afforded special protection under Section 110 of the National Historic Preservation Act.[10] NRHP has established standards by which individual resources (both archaeological and architectural) are evaluated to determine their eligibility for listing. Resources may include buildings, sites, objects, and structures and are placed on the NRHP in reference to their: (1) association with events that have made a significant contribution to the broad patterns of American history; (2) association with the lives of persons significant in our past; (3) architectural or archaeological significance; and/or (4) ability to yield information important in prehistory or history.[11]

A broader range of cultural resources are protected under Section 4(f) of the DOT Act of 1966 which requires projects funded by the DOT to avoid "any significant historic site" unless there is no "feasible or prudent" alternative. This provision generally applies

Boston Logan International Airport

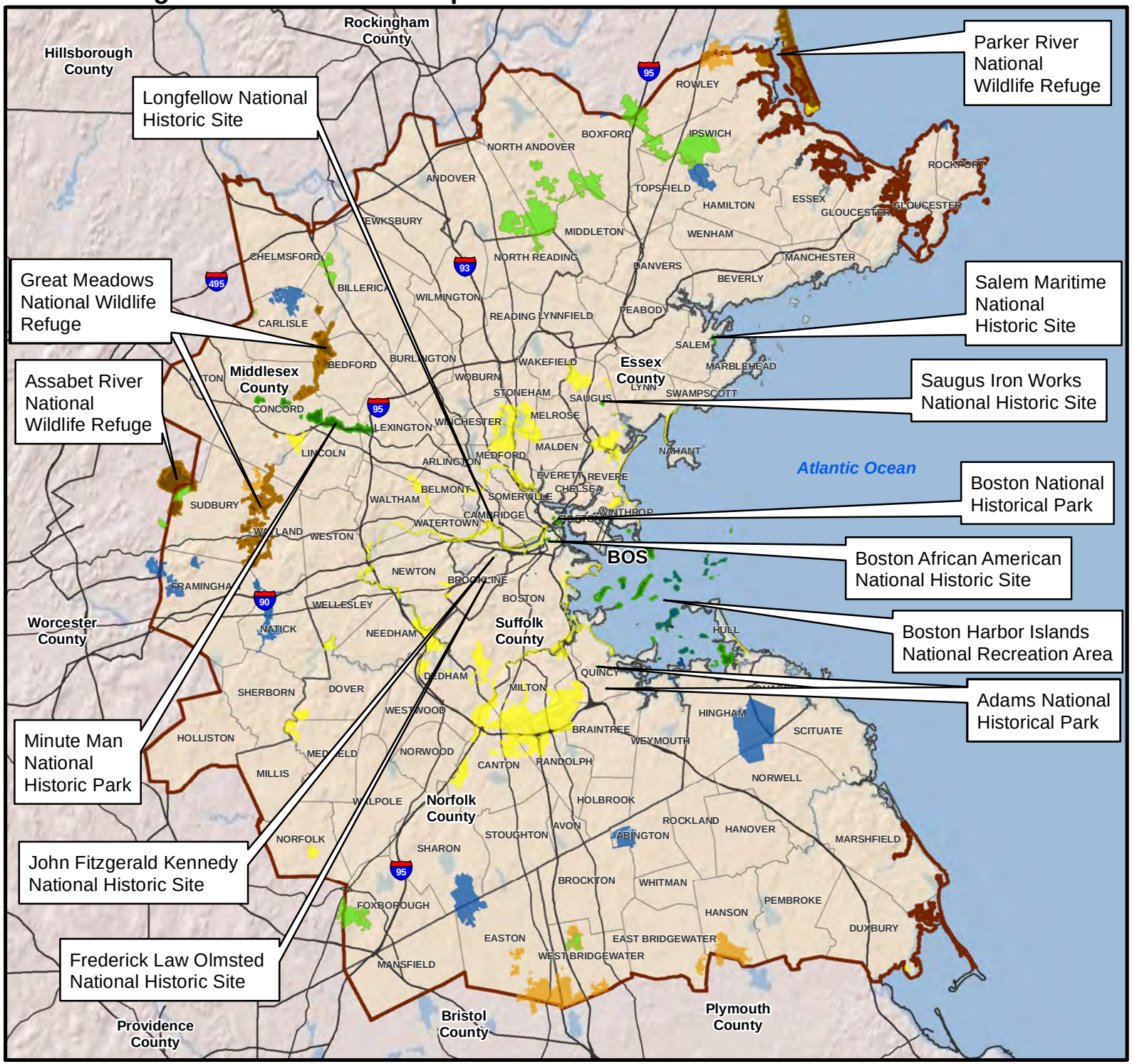

Figure 3-6
National and State Natural Resource Areas

LEGEND

- National Park
- National Wildlife Refuge
- State Park
- State Forest
- State Reservation
- Wildlife Management Area
- Study Area
- Community within Study Area
- County Boundary
- Interstate / Highway

Boston Logan International Airport Runway 33L RNAV SID Final EA

N

0 1 2 4 Nautical Miles

Source: Office of Geographic Information (MassGIS), ESRI

to resources listed, or eligible for listing, in the NRHP.

Although implementation of the Proposed Action does not require the physical taking of any cultural resource, the Proposed Action may result in an indirect impact to cultural resources. Indirect adverse impacts such as noise may be considered a "constructive use" or taking of the property. Therefore, cultural resources in the Study Area have been identified as shown in **Figure 3-7.** There are 2,168 listed national historic resources in the Study Area, the details of which are contained in the project record.

The Massachusetts Historical Commission (MHC) is the designated State Historic Preservation Office in the Commonwealth of Massachusetts. The State Register of Historic Places was established in 1982 and includes buildings, structures, objects and other sites that are designated by local, state, or national resources. Three-hundred twelve (312) cities and towns in Massachusetts include over 60,000 significant historic or archaeological resources. Complete geographic coordinates are not available for State designated resources.

Potential impacts to Tribal lands must also be assessed when evaluating impacts to cultural resources. The Study Area does not include any Native American Lands, Indian Reservations or State Designated American Indian Statistical Areas.

3.3.4 Air Quality

This section describes the existing air quality conditions within the Study Area, as related to national air quality standards.

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for ambient (i.e., outdoor) concentrations of the following criteria pollutants: Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Ozone (ground-level O_3), Sulfur Dioxide (SO_2), Lead (Pb), particulate matter with a diameter of 10 microns or less (PM_{10}) and particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$). Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings.

States must identify geographic areas that do not meet the NAAQS for each criteria pollutant. These areas are then identified as non-attainment areas for the applicable criteria pollutant(s). States must develop a State Implementation Plan (SIP) for non-attainment areas that includes a variety of emission control measures that the state deems necessary to produce attainment of the applicable standard(s) in the future. If a SIP already exists, it must be revised if an area becomes non-attainment for a criteria pollutant.

An area previously designated non-attainment pursuant to the Clean Air Act (CAA) Amendments of 1990 and subsequently re-designated as attainment, is termed a maintenance area. A maintenance area must have a maintenance plan in a revision to a SIP to ensure attainment of the air quality standards is maintained.

Within the Study Area there are no criteria pollutants in non-attainment, and one

Boston Logan International Airport

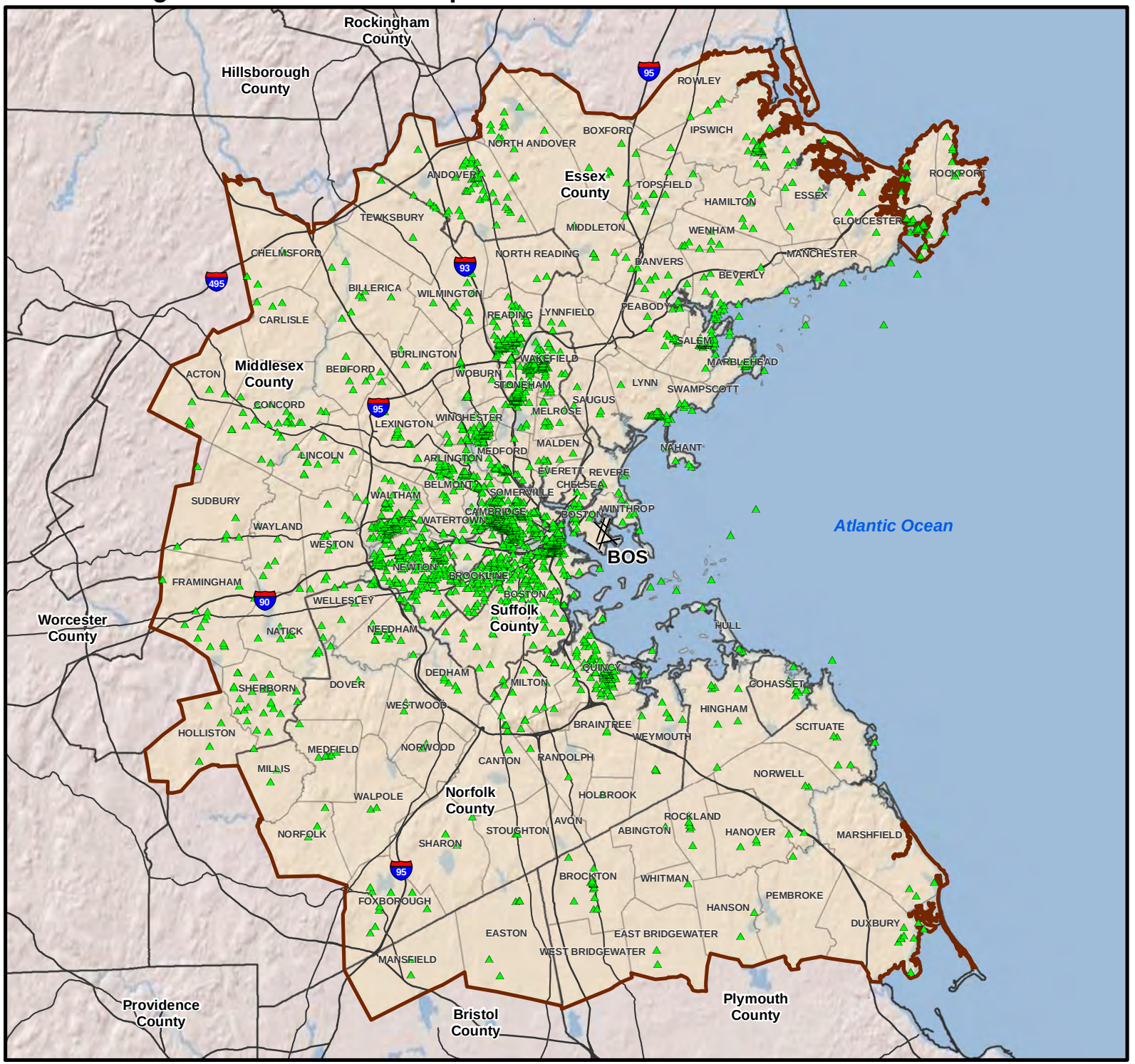

Figure 3-7
National Register of Historic Places and National Historic Landmarks

LEGEND

- NRHP/NHL Property
- Study Area
- Community within Study Area
- County Boundary
- Interstate / Highway

Boston Logan International Airport Runway 33L RNAV SID Final EA

Nautical Miles: 0 1 2 4

N

Source: Office of Geographic Information (MassGIS), ESRI

criteria pollutant, CO, is in maintenance status.

3.3.4.1 Carbon Monoxide (CO)

CO is a colorless, odorless and poisonous gas produced by incompletely burned carbon in fuels. The majority of CO emissions are from transportation sources, with the largest from highway motor vehicles. CO molecules survive in the atmosphere for a period of approximately one month, but eventually react with oxygen to form carbon dioxide. CO levels found in ambient air may reduce the oxygen carrying capacity of the blood. Health threats are most serious for those with angina or peripheral vascular disease. Exposure to elevated CO levels can cause impairment of visual perception, manual dexterity, learning ability, and decreased performance of complex tasks. There are no areas within the Study Area designated non-attainment for CO; however, there are three counties in the Study Area designated as maintenance areas for CO as shown in **Table 3.2**.

Table 3.2

CO Maintenance Areas in the Study Area

Pollutant	County	Classification Standard
CO	Middlesex (Boston, Lowell, Waltham)	Maintenance – Moderate to Not Classified
	Norfolk (Quincy)	Maintenance - Moderate (<= 12.7ppm)
	Suffolk (Boston, Chelsea, Revere)	Maintenance - Moderate (<= 12.7ppm)

Source: US EPA Office of Air Quality Planning & Standards, Green Book, available online at: http://www.epa.gov/airquality/greenbk/anayo_ma.html (accessed November 26, 2012).

3.3.5 Climate

Research has shown there is a direct correlation between fuel combustion and greenhouse gas (GHG) emissions. In terms of U.S. contributions, the General Accounting Office (GAO) reports that "domestic aviation contributes about 3 percent of total carbon dioxide emissions, according to EPA data," compared with other industrial sources including the remainder of the transportation sector (20 percent) and power generation (41 percent).[12] The International Civil Aviation Organization (ICAO) estimates that GHG emissions from aircraft account for roughly 3 percent of all anthropogenic GHG emissions globally.[13] Climate change due to GHG emissions is a global phenomenon, so the affected environment is the global climate.[14]

The scientific community is continuing efforts to better understand the impact of aviation emissions on the global atmosphere. The FAA is leading and participating in a number of initiatives intended to clarify the role that commercial aviation plays in GHG emissions and climate. The FAA, with support from the U.S. Global Change Research Program and its participating federal agencies (e.g., NASA, NOAA, EPA, and DOE), has developed the Aviation Climate Change Research Initiative (ACCRI) in an effort to advance scientific understanding of regional and global climate impacts of aircraft emissions. FAA also funds the Partnership for Air Transportation Noise & Emissions Reduction (PARTNER) Center of Excellence research initiative to quantify the effects of aircraft exhaust and contrails on

global and U.S. climate and atmospheric composition. Similar research topics are being examined at the international level by ICAO.

3.3.6 Federally Threatened and Endangered Species and Migratory Birds

Section 7 of the Endangered Species Act of 1973 (ESA), as amended, (16 U.S.C. § 1531 et seq.) provides protection to any wildlife, which includes endangered plants or animals. In compliance with Section 7(c) of the ESA, federal agencies are required to ensure development/improvements will not jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of the critical habitat of such species. Endangered species are defined as those in danger of extinction throughout all or a significant portion of its range. Threatened species are defined as any species that are likely to become an endangered species, within the foreseeable future, throughout all or a significant portion of its range.

This section describes the affected environment as related to threatened and avian endangered species and migratory bird patterns. Migratory bird patterns are considered as avian species in the Study Area and may be impacted by changes to aircraft routing.

3.3.6.1 Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) provides recommendations for threatened and endangered species under the authority of the ESA, as amended. In December 2012, an official species list was provided by the USFWS via the Information, Planning, and Consultation System (IPaC) tool that identified threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the six-county Study Area. **Table 3.3** provides a summary of the official species list provided by USFWS.

Table 3.3
Threatened, Endangered, Candidate, and Proposed Species by County

Group	Species	Scientific Name	Federal Status	Counties within Study Area Where Known or Believed to Occur
Birds	Piping Plover	*Charadrius melodus*	Threatened	Bristol, Essex, Plymouth, Suffolk[1]
Birds	Roseate Tern	*Sterna dougallii dougallii*	Endangered	Bristol, Essex, Plymouth[2]

Notes:
[1] Species on this list are the species that may be affected by your project and could include species that exist in another geographic area. For example, certain fishes may appear on the species list because a project could cause downstream effects on the species.
[2] Northeast U.S. nesting population.

Source: U.S. Department of Interior Fish & Wildlife Service IPaC – Information, Planning, and Conservation System, December 2012.

There are four species listed by the FWS as threatened or endangered species within the six-county Study Area. There are no proposed or candidate species in the Study Area counties. The threatened and endangered species within the Study Area includes two birds, one flowering plant and one reptile. Because the Proposed Action would have no ground-based impacts, only avian species are considered to be potentially affected.

The Piping Plover (bird) is a threatened species, known to or believed to occur in the Study Area counties of Bristol, Essex, Plymouth and Suffolk. The Piping Plover is known to occur in the Parker River National Wildlife Refuge, located within the Study Area.[15] The Roseate Tern is an endangered species (bird) and is known to or is believed to occur in the Study Area counties of Bristol, Essex and Plymouth.

3.3.6.2 Migratory Birds

Migratory birds are protected by the Migratory Bird Treaty Act (MBTA). The USFWS is the Federal agency responsible for the management of migratory birds as they spend time in habitats of the U.S. Most species of birds, including eagles and other raptors, are protected under the MBTA (16 U.S.C. 703), which makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. The MBTA applies to 1,007 species of migratory birds, identified in 50 C.F.R. § 10.13.[16]

Although the MBTA does not protect the habitats of migratory birds, activities that affect habitats and result in the "take" of migratory birds do violate the MBTA. The Piping Plover and the Roseate Tern are included in the list of migratory birds protected under the MBTA. Changes in where aircraft fly may occur in areas that are traditionally used as migration routes.

Migration routes may be defined as the various lanes birds travel from their breeding ground to their winter quarters. The actual routes followed by a given migratory bird species differ by variables such as distance traveled, time of starting, flight speed, geographic position and latitude of the breeding, and wintering grounds.

Birds migrate along four main routes or flyways in North America: the Atlantic, the Central, the Mississippi, and the Pacific flyways. These flyways are not specific lines the birds follow but broad areas through which the birds migrate. The most frequently traveled migration routes conform very closely to major topographical features that lie in the general north-south movement of migratory bird flyways. Therefore, the lanes of heavier concentration in the Study Area follow principal river valleys and mountain ranges. The Atlantic Flyway is the only North American flyway to cross near or through the Study Area and is the only flyway that could potentially interact with the Study Area.

3.3.6.3 Bald and Golden Eagle Protection Act

Bald eagles and golden eagles receive additional protection under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668). The BGEPA prohibits individuals and companies from knowingly, or with wanton disregard for the

consequences of the Act, taking any bald or golden eagles or their body parts, nests, chicks, or eggs, which includes collection, molestation, disturbance, or killing. The BGEPA affords eagles additional protections beyond those provided by the MBTA by making it unlawful to "disturb" eagles. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, injury to an eagle or causes either a decrease in its productivity or nest abandonment due to interference with breeding, feeding, or sheltering. A permitting process provides limited exceptions to the BGEPA's prohibitions and the Service has issued regulations concerning the permit procedures in 50 C.F.R. § 22.

The Bald Eagle was historically a very rare breeder in Massachusetts, and prior to 1989, the last presumed nesting of this species was at the beginning of the century. In 1982, the Massachusetts Division of Fisheries and Wildlife teamed with Mass Audubon to launch a project to restore the Bald Eagle as a breeding bird in the Commonwealth. The number of nesting eagles has increased and spread across the state in subsequent years. During the winter months, when the nesting season is over, Mass Audubon reports that Bald Eagles can be seen searching for food in any large pond, lake, or river in the state and that nests have been confirmed on lakes in Plymouth County, which is in the Study Area.

Endnotes

[1] http://aspm.faa.gov/opsnet/sys/Airport.asp.

[2] http://www.massport.com/logan-airport/about-logan/Pages/Airlines.aspx.

[3] 14 CFR Part 150, Appendix A, Table 114 CFR Part 150, Appendix A, Table 1 (http://www.gpo.gov/fdsys/pkg/CFR-2011-title14-vol3/pdf/CFR-2011-title14-vol3-part150-appA.pdf).

[5] Population data was determined based on the total number of households and the average population per household. The Census defines a household as consisting of all the people who occupy a housing unit. A house, an apartment or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters. Those residing in group quarters are not included in this analysis. Group quarters include correctional facilities, nursing facilities/skilled nursing facilities, in-patient hospice facilities, mental (psychiatric) hospitals, group homes for juveniles, college/university housing, group homes intended for adult, residential treatment facilities for adults, or workers' group living quarters.

[6] U.S. Department of Transportation Federal Aviation Administration (FAA), Order 1050.1E, CHG 1: *Environmental Impacts: Policies and Procedures*, March 20, 2006, see Appendix A, pg A20. http://www.faa.gov/documentLibrary/media/order/energy_orders/1050-1E.pdf.

[7] 16 USC 460 (http://www.nps.gov/boha/parkmgmt/park-legislation.htm).

[8] http://www.mass.gov/eea/grants-and-tech-assistance/grants-and-loans/dcs/dcr-rant-programs/massachusetts-land-and-water-conservation-fund.html.

[9] Regulations related to the Section 106 process are outlined in 36 CFR Part 800 *Protection of Historic Properties.* (See http://www.achp.gov/regs-rev04.pdf).

[10] 16 USC 470 *National Historic Preservation Act of 1966*, promulgated under 36 CFR Part 800.10. (See http://www.nps.gov/history/local-law/nhpa1966.htm).

[11] 36 CFR Part 60 *National Register of Historic Places* (http://www.gpo.gov/fdsys/pkg/CFR-2011-title36-vol1/pdf/CFR-2011-title36-vol1-part60.pdf).

[12] *Aviation and Climate Change,* GAO Report to Congressional Committees, (2009). http://www.gao.gov/new.items/d09554.pdf.

[13] Alan McIrose, ICAO Environmental Report, *European ATM and Climate Adaptation: A Scoping Study, 2010*, (http://www.icao.int/environmental-protection/Documents/Publications/ENV_Report_2010.pdf).

[14] As explained by the U.S. EPA, "greenhouse gases, once emitted, become well mixed in the atmosphere, meaning U.S. emissions can affect not only the U.S. population and environment but other regions of the world as well; likewise, emissions in other countries can affect the United States." Climate Change Division, Office of Atmospheric Programs, U.S. EPA, *Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act 2-3* (2009), available at http://epa.gov/climatechange/endangerment.html.

[15] USFWS, Species Profile: Piping Plover (Charadrius melodus), http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B079, accessed 12/5/12.

[16] USFWS, Migratory Bird Program, http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtandx.html, Updated April 2012, accessed 12/6/12.